

# **BILL ACCEPTOR**

## **BACKGROUND OF THE INVENTION**

### **1. Field of the Invention:**

The present invention relates to bill acceptors and, more  
5 particularly, to such a bill acceptor, which uses infrared light to  
fetch the image of inks of the bill to be examined and ultraviolet  
light to scan fluorescent fibers of the bill, enabling the user to  
verify the authenticity of the bill accurately.

### **2. Description of the Related Art:**

10 Fast development of high technology greatly improves our  
living standard. However, there are people using high-tech products  
as tool to make illegal acts, for example, to print counterfeit bills.  
People usually verify the authenticity of a banknote by touching or  
visual examination. It is difficult to verify the authenticity of a  
15 banknote in this way. There are bill acceptors which use ultraviolet  
light to scan the inks, hidden line, or embossed stamp. However,  
these bill acceptors cannot eliminate the interference of ambient  
light. The interference of ambient light may cause a false  
determination. Further, because banknote issuing banks may  
20 frequently issue new banknotes with new counterfeit protection  
technology or arrangement to substitute for old banknotes.  
Ordinary people may not have sufficient knowledge to verify the  
authenticity of newly issued banknotes.

In order to help people verify the authenticity of different bills, the inventor invented a bill acceptor entitled "Infrared light ink image display device". This design of bill acceptor is functional. However, there is still room for improvement.

## **5 SUMMARY OF THE INVENTION**

The present invention has been accomplished under the circumstances in view. It is the main object of the present invention to provide a bill acceptor, which uses infrared light to fetch the image of inks of the bill to be examined and ultraviolet light to  
10 scan fluorescent fibers of the bill, enabling the user to verify the authenticity of the bill accurately. It is another object of the present invention to provide a bill acceptor, which eliminates the interference of external light, improving the accuracy of the verification. According to one aspect of the present invention, the  
15 bill acceptor comprises a housing, the housing having a base for holding a banknote for examination, an infrared light emitter adapted to emit infrared light onto the banknote carried on the base of the housing for examination, an ultraviolet light emitter adapted to emit ultraviolet light onto the banknote for visual examination,  
20 an image sensor adapted to pick up infrared light reflected from the banknote carried on the base of the housing and to convert received light signal into image signal, and a display adapted to display image signal obtained from the image sensor for verifying the

authenticity of the banknote. According to another aspect of the present invention, the housing comprises two light-tight side panels vertically disposed at two sides of the base and adapted to eliminate interference of external light.

## **5 BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is an elevational view of a bill acceptor according to the present invention.

FIG. 2 is a side view in section of the bill acceptor according to the present invention.

**10** FIG. 3 is a system block diagram of the present invention.

FIG. 4 is an operational flow of the present invention.

FIG. 5 illustrates the pattern of the printing of a banknote according to the present invention.

**15** FIG. 5A illustrates the pattern of the image obtained from the banknote shown in FIG. 5 by the image sensor after radiation of infrared light according to the present invention.

FIG. 6 illustrates the pattern of the printing of another banknote according to the present invention.

**20** FIG. 6A illustrates the pattern of the image obtained from the banknote shown in FIG. 6 by the image sensor after radiation of infrared light according to the present invention.

FIG. 7 illustrates the pattern of the printing of still another banknote according to the present invention.

FIG. 7A illustrates the pattern of the image obtained from the banknote shown in FIG. 7 by the image sensor after radiation of infrared light according to the present invention.

#### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

5 Referring to FIGS. 1~4, a bill acceptor is shown comprising of a housing 1 having installed therein a first light emitter 2, a second light emitter 3, an image sensor 4, and a display 5.

The housing 1 comprises a base 11 adapted to receive a banknote to be examined, a first power sensor 12 fastened pivotally  
10 with the base 11, a back 13 perpendicularly upwardly extended from the back side of the base 11, a top 14 horizontally forwardly extended from the top end of the back 13, a power adapter 15 provided at the back side of the back 13 and adapted to obtain the necessary electric energy from city power supply, a second power  
15 sensor 16 pivotally fastened to the top 14, and two light-tight side panels 17 bilaterally connected between the top 14 and the base 11.

The first light emitter 2 is installed in the top 14 of the housing 1, comprising an infrared light emitting head 21 aimed at the base 11 and adapted to emit infrared light the banknote 6 that is  
20 put on the base 11 for examination.

The second light emitter 3 is installed in the top 14 of the housing 1, comprising an infrared light emitting head 31 aimed at the base 11 and adapted to emit ultraviolet light onto the banknote

6 for visual examination.

The image sensor 4 is installed in the top 14 of the housing 1, comprising a charge-coupled lens 41.

The display 5 is installed in the back 13 of the housing 1, comprising a display screen 51.

When in use, the banknote 6 to be examined is put on the base 11 inside the housing 1 above the first power sensor 12. At this time, the first power sensor 12 is triggered to start the first light emitter 2, the image sensor 4, and the display 5, thereby causing the first light emitter 2 to emit infrared light onto the banknote 6 and the image sensor 4 to pick up infrared light reflected by inks of the banknote 6 through the charge-coupled lens 41. When picked up reflected infrared light from the banknote 6, the image sensor 4 converts the light signal into image signal, enabling the image signal to be transmitted to the display 5 and then displayed on the display screen 51. Further, when the user lifting the banknote 6 from the base 11, the first light emitter 2 is turned off, and the image sensor 4 as well as the display 5 are turned off too. When the banknote 6 touching the second power sensor 16, the second light emitter 3 is started to emit ultraviolet light onto the banknote 6, thereby causing the fluorescent fibers in the banknote 6 to reflect ultraviolet light, and therefore the user can visually check the authenticity of the banknote 6. Further,

because the side panels 17 are light tight, they eliminate interference of external visible light, assuring high accuracy of the examination of the bill acceptor.

Referring to FIGS. 5, 5A, 6, 6A, 7, and 7A, banknotes 6  
5 issued by banks in different countries are printed with different combinations of inks. Every kind of ink has a particular wavelength. When emitted infrared light onto a banknote 6, the inks of the banknote 6 absorb or reflect emitted infrared light, and the image sensor 4 receives reflected infrared light from the banknote 6 and  
10 then converts received light signal into image signal for verification.

A prototype of bill acceptor has been constructed with the features of FIGS. 1~7. The bill acceptor functions smoothly to provide all of the features discussed earlier.

15 Although a particular embodiment of the invention has been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the invention. For example, the housing of the bill acceptor can be made a table-top housing or  
20 mobile housing convenient for carrying by the user; battery power supply may be used instead of the power adapter to provide the bill acceptor with the necessary working voltage; switch means may be used to substitute for the power sensors. Further, the invention can

be made in the form to verify the authenticity of banknotes, securities, stocks, passports, etc. Accordingly, the invention is not to be limited except as by the appended claims.